

Destined to spend its entire life over the open ocean, Joan originated within an active near equatorial trough which extended from the coast of China across the western Pacific to the Marshall Islands. Joan was initially observed on the 17th of September as a tropical disturbance, with a weak surface cyclone centered near 13N 155E. At the time the disturbance was detected, the southwestern edge of a sharp Tropical Upper Tropospheric Trough (TUTT) was situated over the low level circulation creating unidirectional shear which suppressed growth of the upper level anticyclone above the system. By the 18th, the TUTT had receded northward allowing a small anticyclone to develop and permitting outflow to the west above the disturbance. By the 19th, the TUTT had receded even farther north allowing the anticyclone to fully develop and to generate outflow in all quadrants. With the outflow mechanism established, the disturbance intensified and became TD 21 on the 19th at 0600Z. At 1800Z on the 19th it was upgraded to Tropical Storm Joan, 325 nm south-southwest of Marcus Island (Fig. 4-42).

Initially, Joan tracked northward through a large break in the mid-tropospheric subtropical ridge which had persisted since the passage of Typhoon Hope the previous week. By the 20th, the ridge began to reestablish itself toward the northwest, forcing Joan to acquire a northwestward track during the subsequent 24 hours. During this period the

storm intensified at a rate of 5 kt per 6 hours. On the 21st, Joan slowed its forward speed to 5 kt. As it approached the western extremity of the subtropical ridge it became evident that Joan would recurve toward the northeast. At this point the storm had a well developed outflow pattern with several convective bands consolidating around a central dense overcast approximately 1 degree in diameter.

By 0600Z on the 21st, Joan had attained typhoon intensity while at the midpoint of recurvature. Six hours later, Typhoon Joan attained its peak intensity of 70 kt (Fig. 4-43), and a distinct, well defined eye was visible on satellite data with tightly wrapped convective bands surrounding the center. At 0000Z on the 21st Joan passed 125 nm west of Marcus Island where 33 kt surface winds were observed. By the 22nd Joan had weakened slightly but maintained typhoon intensity as it accelerated to 11 kt toward the northeast. Firmly implanted in the mid-latitude southwesterlies ahead of a long wave trough moving slowly across Japan, Joan continued to track northeastward accelerating to 31 kt by the 24th. It became an extratropical system at 1200Z on the 24th. The remains of Typhoon Joan continued to disrupt shipping lanes in the western Pacific. A ship, UWGR, at 1200Z on the 24th reported sustained winds of 65 kt and a sea level pressure of 975 mb while located near 38N 165E, 60 nm east of the extratropical low.

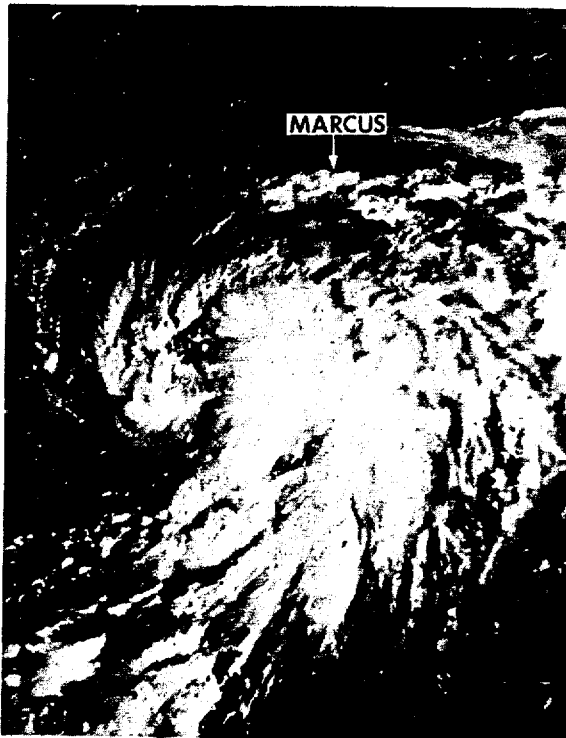


FIGURE 4-42. Joan just after attaining tropical storm intensity 300 nm south-southwest of Marcus, 19 September 1976, 2042Z. (DMSP imagery)



FIGURE 4-43. Infrared image of Typhoon Joan near its 70 kt peak intensity 130 nm west of Marcus, 21 September 1976, 0915Z. (DMSP imagery)